

RT-CW operation of GaN-based Laser Diodes improved by GaN/GaInN optical guiding layers

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GaN-based short-wavelength laser diodes (LDs) are the most important key devices for the applications such as digital versatile disk (DVD) system and so on. The recent excellent progresses of the GaN-based devices such as LDs have been succeeded by the low temperature AlN buffer layer [1], which remarkably increased the crystalline quality of GaN grown on sapphire substrates. The laser irradiation by current injection at room temperature (RT) and the continuous-wave (CW) operation at RT with long lifetime have been achieved by the separate confinement heterostructure (SCH) GaN-based LDs [2,3].

Our multi-quantum-well (MQW)-SCH LDs consisted of GaN/GaInN optical-guiding layers rather than conventional GaN guiding layers in addition to a GaInN/GaN MQW active layer and AlGaIn cladding layers. The LD structure was ridge geometry with the stripe-area of $3 \times 500\mu\text{m}$. Mirror facets were formed by Cl_2/Ar reactive-ion-beam-etching (RIBE). $\text{TiO}_2/\text{SiO}_2$ dielectric multi layers were coated on the facets for high-reflection.

The LDs have attained 95 hours lifetime at 3mW output under RT-CW operation as shown in Fig. 1. The life-test was stopped by the current limit of 200mA. The threshold current and voltage were approximately 70mA and 6V under RT-CW operation as shown in Fig. 2.

References

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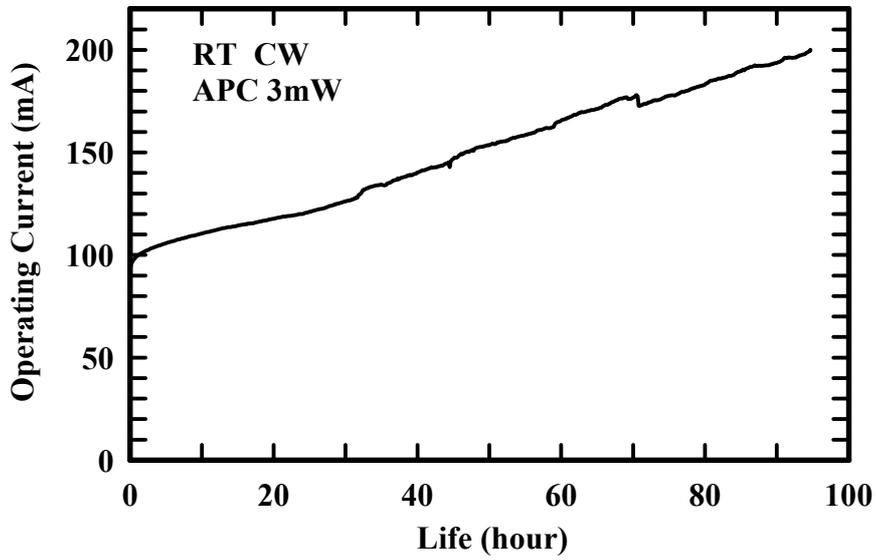


Fig. 1. Operating current as a function of time under a constant output power of 3mW.

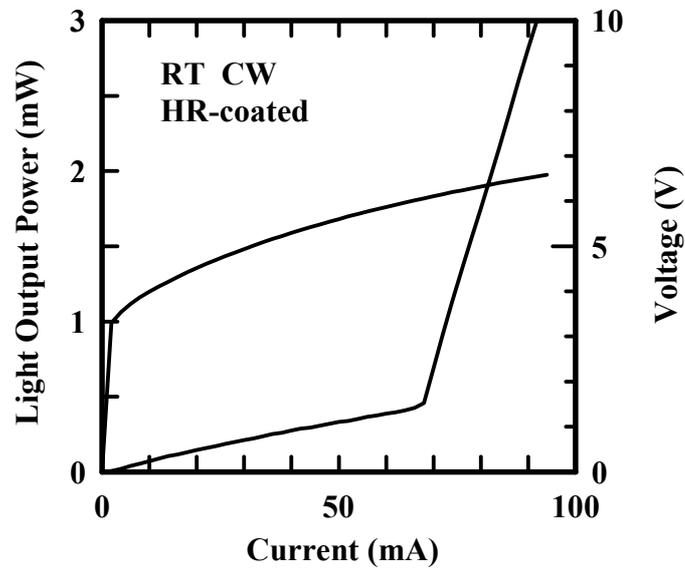


Fig. 2. I-L and I-V characteristics of GaInN/GaN MQW-SCH LD.